view, and this no doubt detracts somewhat from its value to the English manufacturer. On the other hand, the latter will probably find some compensation in seeing how his problems are regarded by other eyes.

After a short historical description, the first eight chapters deal with the standard forms of equipment used in extracting oil from seed by the pressure process. Such matters as the location and planning of the mill, the selection of the best type of apparatus, the handling of the seed, the treatment of the oil, and the moulding of the oil-cake are discussed in ample detail. Economical production is kept in view throughout.

In the second and some later chapters we come across pages of algebraical formulæ which at first sight look like extracts from a mathematical text-book. They are the author's method of analysing in general terms various problems of manufacture, in order to show definitely the effect of adopting certain processes or courses of treatment. For example, the question is discussed algebraically whether in given circumstances it pays best to separate the "screenings" from the seed and sell them, or to pass them through the mill with the seed, or, thirdly, to separate them and grind them up with "cake." When all the factors have been combined into a formula, the man with an eye for an equation can readily see what effect an alteration in any factor will tend to produce. The man not endowed with such an eye can readily puzzle the matter out, and be all the better for the exercise. In such a way an intelligent control over the operations can be maintained.

In the subsequent chapters the method of extracting oil from seeds by percolation with a volatile solvent is described and discussed. Only about 10 per cent., however, of the oil produced in the United States is obtained in this manner.

Questions of output, shrinkage, and cost of production are dealt with at some length; and there are chapters on refining, on boiled oil, and on miscellaneous seed oils. The author contrasts the great development of the cottonseed oil industry in the United States with the comparative neglect shown in regard to other oils—linseed excepted. Rapeseed oil is the most conspicuous failure; but more olive oil should be produced, he thinks, in California, more cocoa-nut oil on the Pacific coast, and more pea-nut oil in the eastern States.

A section on the chemical characteristics of linseed oil gives briefly the chief items which the oil-works chemist requires to know. Information on various technical points, collected from scattered trade journals, has also been included, and certain official rules and regulations, such as those of the New York Produce Exchange and the Minnesota Grain Commission, have been laid under contribution in respect of the commercial aspects of the industry.

Many illustrations of apparatus are given, and the treatment is throughout of eminently practical character. Probably there are few intelligent oil manufacturers who would not be able to get at least some useful hints from the book. C. S.

ZOOLOGY OF THE INDIAN OCEAN.

An Account of the Alcyonarians collected by the Royal Indian Marine Survey Ship "Investigator" in the Indian Ocean. By Prof. J. Arthur Thomson and J. J. Simpson. Part ii., The Alcyonarians of the Littoral Area. With a Report on the Species of Dendronephthya by Dr. W. D. Henderson. Pp. xviii+319+ix plates. (Calcutta: Indian Museum, 1909.)

THE first part of the memoir of the Alcyonarians of the Indian Ocean was published in 1906, and reviewed in NATURE of May 2, 1907. The second part deals with the shallow-water species, and fully maintains the high standard set by the first in wealth of detail and sumptuous illustration.

The authors of this volume have set themselves a task which is far more difficult than that of naming and describing the deep-sea species, and they have faced it boldly and, on the whole, satisfactorily. In the order Alcyonaria there are certain genera of wide distribution in tropical shallow waters which exhibit an infinite variety of form, of mode of branching, of colour, and of detail in skeletal characters, and the zoologist to whom the task is assigned of naming the spirit specimens sent to him by the collectors has to form an opinion as best he can on the vexed question of what characters or groups of characters in combination are sufficiently important to constitute a specific difference. In the absence of any knowledge of the development of the colonies, or of the relation of the different forms of growth to their surroundings on the reef, or of the transmission by heredity of the different characters he uses for purposes of classification, his opinion is rarely one of very great scientific value. Nevertheless, if his task is conscientiously performed, his descriptions accurate, and his illustrations adequate, our science is enriched by a number of recorded facts which may be of considerable value when the solution of the underlying biological problems is seriously taken in hand.

No better illustration of this difficulty could be found than that of the genus Spongodes, so excellently treated in this volume by Dr. W. D. Henderson. Following the example of Prof. Kükenthal, in whose laboratory he worked for some months, Dr. Henderson has distributed the specimens in the collection among no fewer than sixty-one species, of which fifty-three are described as new to science. But the question must occur to anyone who has seen Spongodes in abundance in its natural surroundings whether these numerous species could be maintained, even by the author himself, if another consignment of the same or greater dimensions were sent to him from the same locality. There is an advantage and a disadvantage in creating a large number of specific names for a common genus like Spongodes. It enlarges our knowledge by giving us detailed descriptions and illustrations, and in so far as it does that it is a gain; but, on the other hand, it tends to underestimate the importance of what may be a very definite character of all these common shallow-water genera, the power of adaptability to their immediate

surroundings. An animal that is able to move about can, within certain limits, choose its own immediate surroundings, and is not, therefore, so much in need of adaptability, but a sedentary animal or colony of animals must either adapt itself to the surroundings of the spot to which the larva happened to become fixed or it must perish. The evidence that there is really more than one variable species of Spongodes does not appear to be at all conclusive, but it is at any rate satisfactory to feel, when we contemplate the results of Dr. Henderson's labours, that we have some further knowledge of the varieties of form it may assume.

One word of protest may be said about the use of the generic name Dendronephthya for Spongodes. Whether the application of the strict rules of priority justifies the change or not, and those who study the literature of the genus may fairly claim that it does not, the inconvenience and confusion which the change of such an old and well-known generic name as Spongodes introduces are quite sufficient justification for our refusal to accept it.

As might be expected in the description of a shallow-water fauna, the number of new genera (four) is very small. Of these the curious cup-like genus Studeriotes, with its retractile polyparium, is the most interesting. The new nephthyid Cactogorgia, with its dense armour-plated walls of large spicules, is a remarkable example of the extreme limits to which spiculation in the Alcyonaria may be carried.

The suggestion made by the authors that the genus Chironephthya should be fused with Siphonogorgia is clearly a move in the right direction.

Among the many useful and valuable features of the volume, attention may be specially directed to the summary of the characters of the pennatulid genus Pteroeides. A hope may be expressed that before long a similar summary of the genera and species of the Juncellidæ may be published. This family is evidently under the consideration of the authors, but in the present volume they have only given a tabular statement of the specimens in the collection, without assigning them to specific groups. The excellent coloured plates and numerous illustrations in the text add very materially to the volume, which is a very noteworthy addition to our knowledge of the Alcyonaria.

S. J. H.

THE PHYSIOLOGY OF THE PROTOZOA.

Einführung in die Physiologie der Einzelligen (Protozoen). By Dr. S. von Prowazek. Pp. v+172. (Leipzig and Berlin: B. G. Teubner, 1910.) Price 6 marks.

THIS work differs from all other treatises on the growing subject of protozoology in being largely devoted to the problems of function. It is a condensed account of our present knowledge of this highly important and difficult subject, and consists of summaries of physiological results, often too short to be easily intelligible, but of considerable value to that increasing number of investigators who are interested in recent advances in this field. The author is a well-known and active worker, and does not hesitate to press certain views which have not as yet obtained complete adherence. On the whole, however, he gives an impartial view of the state of each problem so far as the kaleidoscopic nature of the case allows.

With regard to the question of protoplasmic structure, von Prowazek concludes that Bütschli's alveolar theory does not account for all the facts. He holds that protoplasm may be absolutely structureless, and must, therefore, be regarded as polymorphic. Each protozoan cell is, according to him, at least binuclear. This view, though well known to be shared by Hartmann, is not generally accepted, and it would have been advisable for more and better figures of the nuclei of such common forms as those of amœba to have accompanied the statement, which, as it stands, is not rendered quite convincing, though we are aware of the evidence in its support. The functions of the nucleus are dealt with at some length, and their discussion involves the consideration of much experimental evidence; in fact, it would be difficult to name any function of the organism which is not assigned by some writer to the activity of the nucleus. Form, motion, enzymes, or at least proenzymes, respiration, division, reproduction, heredity, regeneration, are all more or less confidently assigned to this versatile structure. Not only are its functional activities increasingly stressed, but the importance of the nucleus in originating structures hitherto supposed to be cytoplasmic is also fully considered. An interesting exception that is noted in this discussion is the fact that amœbæ can live for at least a month without a nucleus, and a portion of a Stentor deprived of its nucleus may regenerate the lost parts of its body.

Attention is directed to the importance of the membrane that encloses the protozoan cell, and to the mode whereby osmosis or absorption is performed. The suggestion of Overton that the membrane contains "lipoids" (*e.g.* lecithin and cholesterin), and that these take an active part in the absorption of substances into the cell, is somewhat over-emphasised, since it is by no means certain how far these "lipoids" contribute to the formation of the ectoplasmic structures. At the same time, so much attention is now being paid to this aspect of biochemistry that the discussion is a very timely one and should lead to further research.

The latter half of the book is occupied by summaries of what is known as to the functions and "tropisms" of protozoa. With regard to respiration, attention is directed to the natural or induced anærobic character of many ciliates as well as to the behaviour of other infusoria when supplied with excess of oxygen. Loeb's view that the presence of a nucleus is essential to the oxidation of the cell is not upheld. An interesting account is given of the nutrition and movements of protozoa, but the behaviour of forms such as amœba, which contain chlorophyll corpuscles, is almost entirely neglected, in spite of the work of Grube and Doflein, and there is room for direct observation on the supposed ingestion of bacteria in the case of many infusoria. With regard to the significance of fertilisation, the author concludes very much in the sense of Doflein as given in his recent